REMARKS/ARGUMENTS

Claims 1-4 and 6-72 remain pending in this application. By the present amendment, the claims have has been amended to more particularly point out the preferred features of the presently claimed invention and/or to obviate one or more of the outstanding objections or rejections. The Specification and Abstract have also been amended to overcome the Examiner's objections thereto. No new matter has been introduced by any of these amendments.

I. Objections to the Specification and Abstract

The Examiner has objected to the Specification and Abstract for various informalities. While not acceding to the Examiner's characterization, solely in an effort to expedite prosecution, Applicants have amended the Specification and Abstract as shown above. In view of these amendments, withdrawal of the outstanding objections are requested.

II. Objections to the Claims

The Examiner has objected to claims 1-6, 39-40, 48-54 and 56 because these claims recite "MEA" instead of "membrane electrode assembly" and has appropriate correction. While not acceding to the Examiner's characterization of the claim language, solely in an effort to expedite prosecution, Applicants have amended claims 2-6, 39-40, 48-54 and 56 as required by the Examiner to recite "membrane electrode assembly" in full, rather than using only the abbreviation "MEA" as in the claims as-filed (Applicants respectfully note that, contrary to the Examiner's statement in the Office Action, claim 1 already recited "membrane electrode assembly" and so no amendment or correction was required). Accordingly, withdrawal of the outstanding objection to the claims is requested.

III. Rejections

A. Rejection Under 35 U.S.C. § 112

The Examiner has rejected claims 1-6, 39-40, 48-54 and 56 under 35 U.S.C. § 112, second paragraph, as allegedly indefinite. Applicants respectfully traverse this rejection.

With respect to the Examiner's statements in paragraphs 12, 13 and 16, while not acceding to the Examiner's characterization of the claim language, solely in an effort to expedite prosecution, Applicants have amended the claims as shown above. In view of these amendments, the Examiner's grounds for rejection have been obviated, and withdrawal thereof is respectfully requested.

With respect to the Examiner's statements in paragraphs 11 and 14, Applicants respectfully disagree. The use of the term "an effective amount", or similar language, in a claim does not render the claim indefinite if the function rendered effective is recited in the claim and one skilled in the art can determine from the specification, including the examples, what an effective amount would be. *See In re Watson*, 517 F.2d 465, 186 USPQ 11 (CCPA 1975); *In re Caldwell*, 319 F.2d 254, 138 USPQ 243 (CCPA 1963). Nevertheless, solely in an effort to expedite prosecution, Applicants have amended the claims as shown above.

More specifically, with respect to the effective amount of catalyst, the claim has been amended to recite "a catalytically effective amount . . . to produce cations from a hydrogencontaining fuel supply" and "a catalytically effective amount . . . to produce anions from a oxygen-containing fuel supply". As such, the functions rendered effective (catalysis of cation/anion production) are now clearly and unambiguously recited in the claim. Specific amounts of catalyst material and ion conducting material that are catalytically effective are expressly disclosed in the examples in the present specification. Moreover, using the information in the examples and the detailed description, one skilled in the art could readily determine effective amounts of other catalytic materials and/or ion conducting materials, without undue experimentation.

Indeed, Applicants note that similar claim language is employed by Voss, U.S. Patent No. 5,441,819, which the Examiner has cited as prior art against the pending claims. As such, this language cannot possibly be indefinite and/or vague under 35 U.S.C. § 112, second paragraph.

Similarly, with respect to the sufficient amount of water, claim 1 has been amended to recite "in an amount effective to sustain hydration of the anode". As such, the function rendered effective (hydration of the anode) is now clearly and unambiguously recited in the claim. One skilled in the art could also readily determine whether a particular amount of water was effective to sustain hydration of the anode, because one skilled in the art knows that if the amount of water is not effective to sustain hydration of the anode, the fuel cell will not function at all.

As to the specific amount of water involved, one object of the present invention is that the amount of water produced at the cathode must be enough for the cell to function, *i.e.* no additional water has to be introduced for the fuel cell to operate. The specific amount of water required for a fuel cell to operate will depend on, *inter alia*, the particular catalyst (*e.g.* a fuel cell having a Pt catalyst may require a different amount of water than a fuel cell having a Pd catalyst) and the specific fuel (*e.g.* a fuel cell using a O2 gas as the oxidant source may require a different amount of water than a fuel cell using air as the oxidant source). These variations are well-understood and recognized by one skilled in the art.

With respect to the Examiner's statements in paragraph 15, Applicants also respectfully disagree. The use of functional language in a claim is not *per se* objectionable, even at the exact point of novelty. *See In re Halleck*, 422 F.2d 911, 164 USPQ 647 (CCPA 1970).

Applicants also dispute the characterization of the claims as "having so many relative terms" as inaccurate. The present claims are directed to a fuel cell having a cathode and an anode, separated by a material such as a polymer electrolyte membrane. Such devices are well-known and understood by one skilled in the art, as shown by the Voss patent cited by the Examiner.

Also well-known and understood by those skilled in the art is that the cathode and anode must have a catalyst on the surface thereof, and that these catalysts produce cations and anions, respectively, from hydrogen and oxygen, respectively. Likewise, also well-known and understood by those skilled in the art is that there must be water present at the anode for it to function. The Voss patent claims clearly show that those skilled in the art recognize the function of the catalysts and the water, and that specific amounts do not need to be recited for a patent to clearly set forth the metes and bounds of the claim.

For at least these reasons, withdrawal of the outstanding rejection is therefore respectfully requested.

B. Rejection Under 35 U.S.C. § 102

The Examiner has rejected claims 1-3, 5-6, 39-40, 48 and 54 under 35 U.S.C. § 102(b) as allegedly anticipated by Voss, U.S. Patent No. 5,441,819. Applicants respectfully traverse this rejection.

As required by claim 1, the catalyst on the surface of the cathode and anode must contain both a catalytic material (such as Pt, Pd, *etc.*) and an ion conducting material, such as NAFION. Voss does not teach or suggest such a device.

More specifically, in support of the outstanding rejection, the Examiner has alleged "that the disclosed additional ingredients [TEFLON, polytetrafluoroethyelene, and/or TEFLON 30B, an aqueous dispersion of 5 micron polytetrafluoroethyelene particles] are capable of imparting ion conductivity thereto." Applicants respectfully disagree.

Contrary to the Examiner's allegation, TEFLON is not an ion conducting material. Rather, just the opposite – TEFLON is widely-recognized as one of the best insulators available in the world today. And as an insulator, TEFLON cannot possibly conduct ions.

Voss therefore does not teach or suggest the inclusion of an ion conducting material in the catalyst on the surface of the anode and cathode. Withdrawal of the outstanding rejection is therefore respectfully requested.

C. Rejections Under 35 U.S.C. § 103

1. Voss in view of Dhar

The Examiner has rejected claims 4-5 under 35 U.S.C. § 103(a) as allegedly obvious over Voss in view of Dhar, U.S. Patent No. 5,242,764. Applicants respectfully traverse this rejection.

Initially, Applicants note that original claim 1 included the recitation that the catalyst comprise both a catalytic material and an ion conducting material. Accordingly, original claim 5 has been cancelled by the amendments above as redundant.

With respect to the specifics of the Examiner's rejection, Applicants respectfully submit that one skilled in the art would not combine Voss and Dhar in the manner suggested by the Examiner and, if they did, they would not arrive at the claimed invention.

More specifically, as discussed above, Voss discloses a fuel cell comprising, *inter alia*, an anode, a cathode and a polymer electrolyte membrane between the cathode and the anode to keep the surfaces separate. Dhar, however, discloses a fuel cell in which the polymer electrolyte membrane separator has been eliminated and, in its place, some ion conducting material has been incorporated into the surfaces of the anode and the cathode.

One skilled in the art would therefore not be motivated to combined Dhar with Voss, primarily because Voss requires a PEM separator, whereas Dhar has eliminated it completely. Based on this very fundamental difference in the structure of the respective fuel cells, the ordinary worker would not be motivated to attempt to combine the teachings of Voss and Dhar.

Moreover, even if one skilled in the art did combine the teachings of Dhar with Voss, then that artisan would eliminate the PEM separator in the resultant fuel cell. Dhar plainly teaches that a PEM separator is not required when an ion conducting material has been incorporated into the cathode and anode. Given this clear and unambiguous teaching, there would be no reason or motivation for the skilled artisan to use a PEM separator in the Voss fuel cell.

For at least these reasons, withdrawal of the outstanding rejection is respectfully requested.

2. Voss

The Examiner has rejected claims 49-53 as allegedly obvious over Voss, as applied to claim 39. Applicants respectfully traverse this rejection.

The deficiencies of Voss with respect to claim 39 have been discussed at length above, but principally relate to the failure of Voss to teach or suggest the inclusion of an ion conducting material in the catalyst on the reactive surfaces of the cathode and anode. This same reasoning applies with respect to claims 49-53, *i.e.* Voss does not teach or suggest an ion conducting material on the reactive surface of the cathode and/or the anode. Withdrawal of this rejection is therefore respectfully requested.

3. Voss in view of Biegert

The Examiner has rejected claim 56 as allegedly obvious over Voss, as applied to claim 2, in view of Beigert, U.S. Patent Publication 2004/0241531. Applicants respectfully traverse this rejection.

The deficiencies of Voss with respect to claim 2 have been discussed at length above. Beigert does not remedy these deficiencies, *i.e.* Biegert also does not teach or suggest an ion conducting material on the reactive surface of the cathode and/or the anode. Withdrawal of this rejection is therefore respectfully requested.

CONCLUSION

In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance are earnestly solicited.

If the Examiner believes that any additional changes would place the application in better condition for allowance, the Examiner is invited to contact the undersigned attorney, at the telephone number listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,
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